which was identified by mixed melting point with an authentic specimen.[11]

No appreciable isomerization occurred if the carbinol was refluxed with 2 mole equivalents of pyridine in benzene for 1 hour since most of the carbinol was recovered unchanged.

B. With Sodium Hydroxide.—To 0.2 g. (0.00053 mole) of the carbinol in 10 ml. of ethanol was added 0.04 ml. of 10% aqueous sodium hydroxide. The solution after 2 minutes at room temperature was raised to boiling over 1 minute, and then drowned in dilute hydrochloric acid and ice. The reaction was worked up as usual to yield a small amount of oil, which after several days yielded 0.02 g. (20%) of needles, m.p. 65–66°, shown to be benzhydrol since the mixed melting point with an authentic specimen was not depressed. No attempt was made to isolate the methyldiphenylcarbinol probably present, since it is a liquid at room temperature.

Triphenylsilyldimethylcarbinol.—To 18 ml. of 0.46 *N* triphenylsilyllithium (0.0086 mole) in tetrahydrofuran was added excess acetone. Color Test I was immediately negative. The reaction mixture was hydrolyzed with dilute acid and the ether extracts, after drying, were evaporated to dryness under reduced pressure. The resultant solid was recrystallized from petroleum ether (b.p. 90–100°) to yield 1.25 g. (45%) of triphenylsilyldimethylcarbinol, m.p. 150–153°. Recrystallization from ethanol raised the melting point to 155–156°. Gilman and Lichtenwalter (unpublished research) report m.p. 158–159°.

When 0.3 g. of this material was refluxed for 6 hours in anhydrous pyridine, 0.23 g. (77%) of the material was recovered unchanged, m.p. 155–156°. After 0.1 g. of the carbinol in 10 ml. of dry ether was treated for 1.5 hours with a drop of sodium–potassium alloy, removal of the ether led to the recovery of the starting material in 87% yield.

Attempted Isomerization of Triphenylsilylmethanol.—A solution of 0.2 g. (0.00069 mole) of triphenylsilylmethanol[2] in 5 ml. of pyridine was refluxed for 18 hours. The pyridine was removed under reduced pressure and the resulting solid melted at 108–112°, and did not depress the mixed melting point with the starting material. Recrystallization from ethanol gave 0.15 g. (75%) recovery of pure starting material, m.p. 116–117°.

(11) We are indebted to Dr. Henry Gilman for a sample of this material, which as received had m.p. 63–64°. The mixed melting point with the above material was 69–70°. Recrystallization of the Gilman sample from ethanol raised the melting point to 71.5–72.7°. On being informed, Gilman recrystallized his sample but the melting point remained 63–64°. Infrared spectra of our material and Gilman's original and recrystallized material in KBr pellets were practically indistinguishable. This phenomenon is evidently a case of polymorphism, of which the polymorph, m.p. 72.0–72.7°, is evidently the stable form.

When 0.3 g. (0.00103 mole) of the material was refluxed in 5 ml. of quinoline for 1 hour the solution turned dark brown. The reaction mixture was drowned in excess dilute hydrochloric acid which was ether-extracted. Removal of the ether and recrystallization of the residue from ethanol led to the recovery of 0.16 g. (53%) of triphenylsilylmethanol, m.p. 115–117°, identified by mixed melting point with an authentic specimen.

Attempted Preparation of Triphenylsilyldiphenylcarbinol from Ethyl Triphenylsilanecarboxylate.—To 2.0 g. (0.006 mole) of ethyl triphenylsilanecarboxylate[3] in 25 ml. of anhydrous ether was added over 45 minutes 40 ml. of 0.5 *N* (0.02 mole) of phenylmagnesium bromide. After 1.5 hours a negative Color Test I was obtained and the reaction mixture was drowned in dilute acid. Workup of the ether layer in the usual manner led to the recovery of 0.73 g. (37%) of the ester, m.p. 96–98°, identified by mixed melting point.

When only one mole equivalent of Grignard reagent was added to 2.0 g. (0.0062 mole) of methyl triphenylsilanecarboxylate and the mixture was stirred for 24 hours prior to workup, a total of 1.76 g. (88%) of the ester, m.p. 107–109°, was recovered and identified.

When 0.0175 mole of phenyllithium was added to 2.0 g. (0.006 mole) of ethyl triphenylsilanecarboxylate, the first few drops of reagent produced a red color and the reaction mixture became warm. A solid precipitated during the next 7 hours stirring, although a positive Color Test I was still obtained after this time. The reaction mixture was drowned in dilute acid and worked up as usual to yield a total of 1.20 g. (60%) of tetraphenylsilane, m.p. 232–234°, identified by mixed melting point.

Hydrolysis of Benzhydryloxytriphenylsilane.—A solution of 0.2 g. (0.00045 mole) of the compound in 15 ml. of ethanol was treated at room temperature with 1 ml. of 10% aqueous sodium hydroxide for 10 minutes. The reaction mixture was drowned in dilute acid and then worked up to yield 0.06 g. (48%) of triphenylsilanol, m.p. 150–152°, and 0.06 g. (30%) of recovered benzhydryloxytriphenylsilane, m.p. 82–84°.

When the time and amount of alkali were each reduced to one-half the above amounts, only recovered starting material was obtained. Under identical conditions, triphenylsilyldiphenylcarbinol was isomerized to benzhydryloxytriphenylsilane, but apparently no hydrolysis occurred since no triphenylsilanol was isolated.

Acknowledgment.—The author is indebted to Dr. Henry Gilman for valuable discussions concerning this research and to the National Research Council of Canada for a grant in support of part of this work.

TORONTO, CANADA

[CONTRIBUTION FROM THE DEPARTMENTS OF CHEMISTRY AND CHEMICAL ENGINEERING, UNIVERSITY OF FLORIDA]

Fluorocarbon Nitrogen Compounds. II.[1] The Synthesis and Properties of Perfluorodimethylglycine, $(CF_3)_2NCF_2COOH$[2]

BY JOHN A. YOUNG AND RICHARD D. DRESDNER

RECEIVED NOVEMBER 9, 1957

A perfluoroamino acid, $(CF_3)_2NCF_2COOH$, has been synthesized by the electrochemical process from both the methyl ester and N,N-dimethylamide of dimethylglycine. Cleavage and cyclization products have been identified as $(CF_3)_2NCOF$, $(CF_3)_3N$, $(CF_3)_2NCFOCF_2N(CF_3)CF_2$ and probably $CF_3NCF_2CF_2OCF_2$. The nitrogen atom is not basic and the free acid resembles non-nitrogen containing fluorocarbon acids in its chemistry, except that the silver salt is unstable in aqueous solution. The preparation of various derivatives is described.

Although certain derivatives of perfluorodimethylcarbamic acid are available through the electrochemical process,[1] their use in the synthetic chemistry of nitrogen-containing fluorocarbons is severely limited by instability. This paper reports the synthesis of a stable nitrogen-containing fluorocarbon acid, perfluorodimethylglycine.

Preferred starting materials for the electrochemical preparation of fluorocarbon acids are the organic acid fluoride or chloride. Since, however,

(1) For the previous paper in this series, see J. A. Young, T. C. Simmons and F. W. Hoffmann, THIS JOURNAL, **78**, 5637 (1956).

(2) Presented before the Organic Division of the American Chemical Society Meeting at Miami, Fla., April 7–12, 1957. This work was supported by a grant from the Office of Naval Research, and reproduction in whole or in part is permitted for any purpose of the United States Government.

acid halides of amino acids are difficult to prepare and convert very easily to the hydrohalide of the free acid, they were not practicable in this case. Two starting materials were studied, the methyl ester and N,N-dimethylamide of dimethylglycine, these two being chosen because the N,N-dimethylamido group has shown fairly good properties during the process, while the methyl ester was on hand as a by-product of the amide synthesis. The desired product, $(CF_3)_2NCF_2COF$, was obtained from each of these. Yields were consistently poor, about 6% over-all.

The electrochemical process is almost invariably complicated by cleavage and cyclization effects, and with the fairly complex molecule $(CH_3)_2NCH_2CON(CH_3)_2$ several compounds resulting from these reactions were isolated. Products boiling below −80° were not examined; above this temperature were found $(CF_3)_2NCF_2COF$, formed by the desired cleavage between carbonyl carbon and amide nitrogen, and the pair $(CF_3)_3N$ and $(CF_3)_2NCOF$, resulting from carbon–carbon bond cleavage. Splitting of the carbon–amine nitrogen bond either did not take place or resulted eventually in very small fragments, as the primary product of this cleavage, $CF_3CON(CF_3)_2$, was not detected. It is interesting to note the complete absence, except for the probable presence of NF_3, of any compounds in which nitrogen was bonded directly to fluorine or to another nitrogen, although both these species, such as $(CF_3)_2NF$ and $(CF_3)_2NN(CF_3)_2$, are fairly common in direct fluorination of nitrogen-containing compounds.[3] The same cleavage responsible for $(CF_3)_2NCF_2COF$ might be expected to produce $(CF_3)_2NF$, but neither in the present case nor in electrochemical fluorination of carbamyl chlorides has this compound been found.

A very strong tendency toward cyclization is manifested in the electrochemical process, and only where this is difficult or impossible is any considerable yield of the perfluoro analog of the starting material obtained. For instance, although $(CF_3)_2NCON(CF_3)_2$ has been obtained from tetramethylurea,[1] in the present case the additional carbon atom in $(CH_3)_2NCH_2CON(CH_3)_2$ permitted ring closure through the carbonyl oxygen and the amine methyl group, leading to the oxazolidine $(CF_3)_2NCFOCF_2N(CF_3)CF_2$ rather than to the acyclic analog $(CF_3)_2NCF_2CON(CF_3)_2$. This ring structure was confirmed by absence of reactivity of the compound toward acid or base, absence of –COF or –CO lines in the infrared spectrum, molecular weight and elemental analysis corresponding to the formula $C_6F_{14}N_2O$, and a nuclear magnetic resonance spectrum which showed two strong lines, relative intensities 2:1, in the CF_3 region and two lines of approximately equal intensity in the CF_2 region. The fine structure showed the weaker CF_3 line to be split by interaction with the CF_2 groups alpha to the nitrogen atom, and one of the CF_2 groups to be much broader than the other because of coupling with the N–CF_3 groups. The CF line was not found, presumably because of extensive broadening through interaction.

One other product was obtained in appreciable yield. This was a gas, b.p. 22°, inert toward acid or base, having a molecular weight identical with $(CF_3)_2NCF_2COF$ and $CF_3CON(CF_3)_2$, but showing no infrared band for carbonyl or acid fluoride. These data indicate a cyclic structure, logically $CF_3NCF_2CF_2OCF_2$, formed by the same ring closure reaction as $(CF_3)_2NCFOCF_2N(CF_3)CF_2$, with concomitant loss of the amide dimethylamino group. The NMR spectrum, however, did not fully substantiate this structure. One line appeared in the CF_3 region and two in the CF_2 region, but the intensity of the former was definitely greater than that of the latter, although a gas phase chromatogram proved the absence of impurities in large enough amounts to cause this ambiguity. Some doubt must remain therefore in the identification of the compound as $CF_3NCF_2CF_2OCF_2$; however, this formula appears to be the most probable for the following reasons: (1) molecular weight and elemental analysis indicate the molecular formula C_4F_9NO; (2) infrared data and chemical inertness exclude the presence of –COF and –CO groups; (3) the boiling point is within a few degrees of other C_4F_9NO isomers ($(CF_3)_2NCF_2COF$, b.p. 25°, $(CF_3)_2NCOCF_3$, b.p. 29°) and is 25° lower than that of the next higher homolog, $C_2F_5NCF_2CF_2OCF_2$, b.p. 47°, this being a normal interval for one CF_2 group; (4) the oxazolidine ring is apparently a favored cyclization structure for substances containing nitrogen and oxygen during the electrochemical process, the same ring structure having been obtained from electrochemical fluorination of higher dialkyl carbamyl chlorides.[1]

Nuclear magnetic resonance data supported the proposed structure $(CF_3)_2NCF_2COOCH_3$ for the methyl ester. One component was found for the proton resonance, at the positive extreme of values reported for $-OCH_3$ because of the effect of the large fluorinated group. Fluorine resonance consisted of two peaks, the relative intensities for fluorine in CF_3 and CF_2 being 6:2. Fine structure of the peaks was in accord with the structure given.

The acid fluoride was converted into the free acid and some of the usual derivatives. As expected, the nitrogen atom showed no gross basic properties, $(CF_3)_2NCF_2COOH$ being a strong liquid acid which fumed in air and reacted vigorously with alkalies, alcohols and amines. It resembled other fluorocarbon acids of similar molecular weight, and the chemistry of derivative preparation was conventional with only one exception. As far as could be ascertained from the few known acids of somewhat similar structure, the boiling point contribution of the nitrogen atom was roughly equivalent to that of a carbon atom, as is the case in the fluorocarbon nitrides.

The only abnormality found was in the stability of the silver salt, which decomposed so rapidly in the presence of water that considerable loss was in-

(3) (a) J. A. Cuculo and L. A. Bigelow, THIS JOURNAL, **74**, 710 (1952); (b) J. A. Gervasi, M. Brown and L. A. Bigelow, *ibid.*, **78**, 1679 (1956); (c) F. P. Avonda, J. A. Gervasi and L. A. Bigelow, *ibid.*, **78**, 2798 (1956).

PROPERTIES OF $(CF_3)_2NCF_2COOH$ AND DERIVATIVES

Compound	B.p., °C.	Mol. wt. Calcd.	Mol. wt. Found	Carbon, % Calcd.	Carbon, % Found	Hydrogen, % Calcd.	Hydrogen, % Found	Fluorine, % Calcd.	Fluorine, % Found
$(CF_3)_2NCF_2COOH$[a]	131			19.8	19.4	0.4	0.6	61.9	61.4
$(CF_3)_2NCF_2COOCH_3$[b]	90			23.0	23.2	1.2	1.4	58.6	58.6
$(CF_3)_2NCF_2CONH_2$	88[c]			19.5	19.7	0.8	0.8	62.2	62.1
$(CF_3)_2NCF_2CN$	21	228	229	21.0	19.0			69.7	70.0
$CF_3\underline{NCF_2CF_2OCF_2}$	21	249	249	19.3	19.7			68.6	68.5
$(CF_3)_2\underline{NCFOCF_2N(CF_3)CF_2}$	81	382	382		[d]	7.7	8.0[e]	75.8	75.6

[a] $n^{25}D$ 1.2940. [b] $n^{25}D$ 1.2930. [c] Melting point. [d] Carbon analysis gave extremely low results; calcd. 20.6, found 8.8. [e] Nitrogen, %.

curred during the conventional preparation from Ag_2O and the aqueous acid. Once dry, the salt was not greatly less stable than other fluorocarbon acid silver salts. It reacted readily with iodine at 130° to give a volatile iodine-containing material and a compound which may possibly have been the coupled product $(CF_3)_2NCF_2CF_2N(CF_3)_2$, resulting from reaction of the iodide with the silver salt, but neither of these substances was positively identified.

Sodium salts of fluorocarbon acids which are not capable of β-fluorine elimination cannot follow the usual pyrolytic reaction of olefin formation, but show a much more complex behavior on thermal decomposition, CF_3COONa being reported to give principally the acid fluoride and the acid anhydride.[4] With $(CF_3)_2NCF_2COONa$, reaction started at a fairly low temperature, about 230°. The main products were the acid fluoride and a higher boiling material containing several components, which reacted only partially with alcohol and could not have been substantially the anhydride.

Experimental

Starting Materials.—To a stirred solution of 225 g. (5 moles) of dimethylamine in 400 ml. of benzene, 180 g. (1.6 moles) of methyl chloroacetate was added over three hours at 10° or less. Stirring was continued for two hours with the ice-bath removed, and the contents were allowed to stand overnight. After filtration and removal of solvent, distillation *in vacuo* gave 135 g. of ester (69%), b.p. 50° (25 mm.), and 34 g. of amide (16%), b.p. 50° (0.5 mm.). By increasing the molar ratio of amine and running at a slightly higher temperature, these yields could be changed to give 45% of theory for the amide and 37% for the ester. The ester was also converted to the amide in 72% yield by heating with excess dimethylamine at 100° for 15 hours.

Electrochemical Process.—This was carried out as previously described.[5] In five separate runs, the proportion of $(CF_3)_2NCF_2COF$ in the crude product varied from almost 50% to less than 10%, and the proportions of other components also varied widely. The amount of material with the same number of atoms as the starting materials (or their HF solvolysis products) seemed to be very closely related to the voltage applied across the plates, none of the oxazolidine and little of the amino acid fluoride being obtained above 5.1 volts.

Treatment of Cell Products.—The crude, dried, Dry Ice condensate from the cell run was transferred *in vacuo* to the pot of a low-temperature fractionating column. The results given for the following distillation of 300 g. of crude product, resulting from 379 g. of $(CH_3)_2NCH_2CON(CH_3)_2$, are representative, although the amounts of each cut changed with each run. Components were identified in the following fractions.

Fraction 2, b.p. −14 to −8°, mol. wt. 194–208, 30 g., was purified by bubbling successively through 50% aqueous alkali and concentrated sulfuric acid. This treatment removed about half the material. The remainder gave a mol. wt. of 221 calcd. for $(CF_3)_3N$ 221 and showed an infrared spectrum identical with that of known $(CF_3)_3N$, b.p. −10.5°.[6]

Fraction 4, b.p. 11.5°, mol. wt. 217–220, 75 g., apparently contained a number of compounds. Reaction with methanol gave a quantity of $(CF_3)_2NCOOCH_3$, b.p. 73–76°, mol. wt. 221, equivalent to a $(CF_3)_2NCOF$ content of about 50%. No other compounds could be identified. Known values for $(CF_3)_2NCOOCH_3$ are b.p. 76°, mol. wt. 221. The perfluorocarbamyl fluoride is often found as a cell product with starting materials of the general type used here.[1]

Fraction 6, b.p. 22 to 26°, mol. wt. 248–251, 75 g., gave a strong infrared band at 5.3 μ, indicative of a −COF group. On reaction with methanol, the methyl ester was obtained, b.p. 90°. Usually, though not always, some part of this fraction remained unreacted. Subsequent treatment of the inert residual material with 40% aqueous alkali had no effect, the mol. wt. remaining at 249–251, and an infrared spectrum showed no −COF band and no more than a trace of carbonyl. Evidence for identification of this compound as $CF_3\underline{NCF_2OCF_2CF_2}$ is discussed earlier in this paper.

The remainder of the cell product boiling above 26°, 39 g., on fractionation gave only one distillation flat, b.p. 81–82°, mol. wt. 381–383, no acid fluoride and no more than a trace of carbonyl indication by infrared, inert toward aqueous or alcoholic alkali. The NMR spectrum confirmed a cyclic perfluoro-oxazolidine structure $(CF_3)_2\underline{NCFOCF_2N(CF_3)CF_2}$.

$(CF_3)_2NCF_2COOH$ Derivatives.—$(CF_3)_2NCF_2COF$ and $(CF_3)_2NCF_2COOCH_3$ were made as described. The ethyl ester, similarly prepared, had a b.p. of 104°, the 14° boiling point increment from methyl to ethyl being similar to that in the carbamates; $(CF_3)_2NCOOCH_3$, b.p. 76°; $(CF_3)_2NCOOC_2H_5$, 90°.

$(CF_3)_2NCF_2CONH_2$: Anhydrous ammonia, 3 g., was bubbled through 6.5 g. of $(CF_3)_2NCF_2COOCH_3$ at room temperature. Part of the methanol formed was removed, the amide crystallizing in the residue on cooling. Recrystallization from benzene gave 5 g. (82%) of colorless crystals, m.p. 87–88°.

$(CF_3)_2NCF_2CN$: The amide, 5 g., was mixed with 10 g. of P_2O_5 and heated, the gaseous nitrile being condensed in a Dry Ice trap; yield 3.5 g. (72%), $(CF_3)_2NCF_2CN$, b.p. 21°.

$(CF_3)_2NCF_2COOH$: To 25 g. of methyl ester, 9 g. of KOH in 20% aqueous solution was added and the mixture refluxed for one hour. Saponification was vigorous and apparently complete in about 15 minutes. The resulting solution was acidified, made barely alkaline, and evaporated; 50 ml. absolute alcohol was added to the solid residue and refluxed 30 minutes, the cooled solution filtered and the alcohol removed, after which the salt was dried *in vacuo* for two days. Ten ml. of concd. sulfuric acid was then added and the perfluoro acid distilled off; yield 20 g. (85%), b.p. 131°.

$(CF_3)_2NCF_2COOAg$: Ten grams of $(CF_3)_2NCF_2COOH$ was dissolved in 25 ml. of H_2O and excess Ag_2O added. The oxide dissolved readily, but the resulting solution first turned cloudy, then darkened rapidly over five or ten minutes. When dissolution ceased, the excess oxide was filtered off and the water removed as quickly as possible at room temperature by applying vacuum. The dark residue

(4) J. H. Simons, R. L. Bond and R. E. McArthur, THIS JOURNAL, **62**, 3477 (1940).

(5) (a) J. H. Simons, *et al.*, *J. Electrochem. Soc.*, **95**, 47 (1949); (b) A. F. Clifford, H. K. El-Shamy, H. J. Emeleus and R. N. Haszeldine, *J. Chem. Soc.*, 2372 (1954); (c) F. W. Hoffman, T. C. Simmons, *et al.*, THIS JOURNAL, **79**, 3424 (1957).

(6) R. D. Dresdner, *ibid.*, **79**, 69 (1957).

was dissolved in benzene, Celite added, and the solution filtered. The benzene was removed *in vacuo* and the colorless residue recrystallized from a 1:1 benzene–hexane mixture; yield 10.5 g. (73%), m.p. (dec.) 184°.

The silver salt was allowed to react with iodine at 130° under reduced pressure.[7] Two cuts were obtained on distillation; 0.5 g., b.p. 58–59°, containing combined iodine by qualitative analysis, and 3.5 g., b.p. 98–100°. The latter did not contain iodine. Its molecular weight (Dumas) was estimated as about 440.

Pyrolysis of $(CF_3)_2NCF_2COONa$.—Sixteen grams of the dry sodium salt was heated, reaction occurring at about 230°. Two cuts were obtained on distillation of the 11 g. of crude product. Fraction I, 4.5 g., b.p. 23°, mol. wt. 251–258, consisted mainly of the acid fluoride $(CF_3)_2NCF_2COF$, b.p. 25°, mol. wt. 249. It was identified further by conversion to the methyl ester, b.p. 88–89°, $n^{25}D$ 1.2974, mol. wt. 255. Known values for $(CF_3)_2NCF_2COOCH_3$ are b.p. 90°, $n^{25}D$ 1.2930, mol. wt. 261. Infrared spectra were identical. Fraction II, 4.0 g., b.p. 105–108°, reacted only partially with methanol to give a product not identical with the methyl ester of $(CF_3)_2NCF_2COOH$. A gas chromatogram showed the presence of four main components and numerous other traces.

All infrared spectra were taken on a Perkin–Elmer double beam instrument, using a 5-cm. gas phase cell whenever possible. The gas chromatograms were made on a Perkin–Elmer Fractometer, using a 2 meter × 1/4″ o.d. column. Good resolution generally was obtained with Celite packing coating with the ethyl ester of Kel-F acid 8114.

Acknowledgments.—The authors are greatly indebted to Prof. H. S. Gutowsky of the University of Illinois for his nuclear magnetic resonance studies, and to Prof. T. M. Reed of this University for his aid in obtaining and interpreting the gas chromatograms.

GAINESVILLE, FLORIDA

(7) G. H. Crawford and J. H. Simons, THIS JOURNAL, **75**, 5737 (1953).

[CONTRIBUTION FROM THE RESEARCH LABORATORIES OF NOVOCOL CHEMICAL MFG. CO., INC.]

N-(Substituted Aminoacyl)-chloroanilines

BY ELIAS EPSTEIN AND DANIEL KAMINSKY

RECEIVED NOVEMBER 21, 1957

N-(Substituted aminoacetyl)- and propionylanilines of *m*-chloroaniline, methylcholoroanilines and alkoxychloroanilines were prepared. When screened on laboratory animals, several of these compounds had a high anesthetic efficiency (ratio of potency to toxicity) and low irritation warranting additional investigation.

Although N-(substituted aminoacyl)-anilines were prepared as early as 1891,[1] Einhorn[2] was the first in 1898 to recognize their ability to produce a local anesthetic effect. These early compounds were too irritating for clinical use. It was not till 1946 when Lofgren[3] prepared α-diethylamino-2,6-dimethylacetanilide (lidocaine) that an anesthetic of this structure was used clinically to any extent.

The clinical effectiveness of a chloro substituted anilide, *n*-butylamino-2-chloro-6-methylacetanilide (Hostocain), was first described by Harnisch.[4] Since then several chloroanilides have been reported.[5–9]

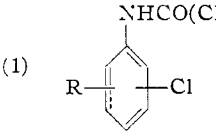
In our continuing investigation on new local anesthetics, we have prepared N-substituted aminoacetyl- and propionylanilines where the phenyl group was substituted as follows: 3-chloro, 2-methyl-3-chloro, 2-methyl-4-chloro, 2-methyl-5-chloro, 2-methyl-6-chloro, 3-chloro-4-methyl and 3-chloro-6-alkoxy.

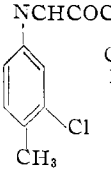
The general method used for the preparation of these compounds consisted of treating a chloroacyl chloride with a substituted aniline and condensing the resulting anilide with a primary or secondary amine. Table I lists the substituted chloroacyl anilines with their melting points and analyses. Table II lists the melting points, molecular weight determinations and analyses of the N-(substituted aminoacyl) substituted aniline hydrochlorides.

(1) W. Majert, British Patent 5,269 (1891).
(2) A. Einhorn, German Patent 106,502 (1898).
(3) N. Lofgren, *Arkiv Kemi, Mineral. Geol.*, **A22**, No. 18 (1946).
(4) H. Harnisch, *Deut. zahnärztl. Z.*, **22**, 1224 (1953).
(5) D. Beke, K. Lempert and L. Gyermek, *Acta Chim. Acad. Sci. Hung.*, **5**, 143 (1954).
(6) British Patent (a) 726,080 (1955); (b) 759,744 (1956).
(7) Swiss Patents 306,512-3 (1955); 311,578, 311,585-6, 311,588, 311,590-6 (1956).
(8) A. E. Wilder Smith and E. Hofstetter, *Helv. Chim. Acta.*, **38**, 1085 (1955).
(9) U. S. Patent 2,801,247 (1957).

TABLE I

ω-CHLOROACYLCHLOROANILINES

(1) 

R	Cl position	n	M.p., °C.	Formula	Chlorine, % Calcd.	Found
H	3	1	100–101[a]	$C_8H_7ONCl_2$	34.76	34.21
H	3	2	81–83	$C_9H_9ONCl_2$	32.53	32.38
2-CH_3	3	1	134–136	$C_9H_9ONCl_2$	32.53	32.07
2-CH_3	4	1	130–131[b]	$C_9H_9ONCl_2$	32.53	32.21
2-CH_3	4	2	128–129	$C_{10}H_{11}ONCl_2$	30.57	30.14
2-CH_3	5	1	139–141	$C_9H_9ONCl_2$	32.53	32.73
2-CH_3	6	1	142–143[c]	$C_9H_9ONCl_2$	32.53	32.32
4-CH_3	3	1	94–95	$C_9H_9ONCl_2$	32.53	32.47
4-CH_3	3	2	116–117	$C_{10}H_{11}ONCl_2$	30.57	30.19
2-OCH_3	5	1	105–107	$C_9H_9O_2NCl_2$	30.34	30.60
2-OC_4H_9	5	1	91–93	$C_{12}H_{15}O_2NCl_2$	25.72	25.91
(2) 			109–111	$C_{10}H_{11}ONCl_2$	30.57	30.61

[a] Reported[5] m.p. 100–101°. [b] Reported[5] m.p. 128–129°. [c] Reported[6a] m.p. 140–141°.